FEDERATED MALAY STATES.

ANNUAL REPORT

IMPERIAL BUREAU OF MYCOLOGY
1 AUG 1925

ON THE

DEPARTMENT OF AGRICULTURE,

S.S. AND F.M.S.,

FOR THE YEAR

1924

BY

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Acting Secretary for Agriculture, S.S. and F.M.S.

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FEDERATED MALAY STATES.

REPORT OF THE SECRETARY FOR AGRICULTURE, STRAITS SETTLEMENTS AND FEDERATED MALAY STATES, FOR THE YEAR 1924.

STAFF.

1. Mr. A. S. Haynes was in charge of the Department as Secretary for Agriculture, Straits Settlements and Federated Malay States until the 18th February, 1924, from which date until the end of the year Mr. G. E. Shaw acted as Secretary for Agriculture.

2. Mr. F. de la Mare Norris returned from leave on 8th July, 1924, and was seconded for service in Johore as Inspector of Agriculture from the 22nd July, 1924.

Mr. W. N. C. Belgrave, Plant Physiologist, continued to act throughout the year as Assistant to the Secretary for Agriculture in addition to his own duties.

Chemical Division.—Major B. J. Eaton, o.b.e., Agricultural Chemist, was absent on leave from the 25th April, 1924, to the 31st December, 1924. Mr. R. O. Bishop was in charge of the Division during Major Eaton's absence.

Field Division.—Mr. F. W. South, Chief Agricultural Field Officer, was in charge.

Mr. F. Birkinshaw, Agricultural Field Officer, Perak North, was on leave from the 19th January, 1924, to the 4th December, 1924.

Mr. A. E. C. Doscas, Agricultural Field Officer, Negri Sembilan, who was seconded for service in Johore, proceeded on leave on 1st August, 1924.

Mr. G. E. Mann was transferred to Pahang as Agricultural Field Officer, Pahang West, on the 10th December, 1924.

Raja Mahmud bin Raja Ali, Senior Agricultural Assistant, acted as Agricultural Field Officer, Selangor, from the 20th October, 1924, to the end of the year.

Mr. J. L. Minto, Agricultural Field Officer, Pahang East, left the service on 23rd May, 1924, on termination of his agreement. He was succeeded by Mr. J. C. Sworder, a temporary appointment.

Mycological Division.—Mr. A. Sharples, Mycologist, returned from leave on 11th March, 1924, taking over charge of the Division from Mr. A. Thompson.

Mr. Mason, Assistant Mycologist, was lent to the Inspection Division for duty as an Agricultural Field Officer and was seconded for service in the Colony on the 13th June, 1924.

Entomological Division.—Mr. G. H. Corbett, Entomologist, went on leave on 11th May, 1924. Mr. B. A. R. Gater, Assistant Entomologist, took charge of the Division during his absence.

Botanical Division.—Mr. H. W. Jack, Economic Botanist, was in charge.

Mr. W. N. Sands, Assistant Economic Botanist, was on leave from 4th April, 1924, until the end of the year.

Agricultural Divisions.—Mr. F. G. Spring, Agriculturist (Rubber) went on leave on the 23rd May, 1924; and Mr. B. Bunting, Agriculturist, on 12th February, 1924. Mr. J. N. Milsum, Assistant Agriculturist, acted for both officers, combining the duties.

Economic Division.—Mr. D. H. Grist, Agricultural Economist, was on leave of absence from the 17th March, until 5th December. During his absence, Captain J. M. Howlett, m.c., was in charge of the Division.

3. During the year the "Inspection" and "Instruction" Divisions of the Department were reconstituted as "Field" and "Economics" Divisions. The new Economics Division is concerned with the marketing of produce, especially the produce of small holdings, with Agricultural Shows and Conferences, Malay publications on agricultural subjects and the advancement of co-operative institutions in native agriculture. The Field Division has as its purview instruction and inspection in the field, control of pests and diseases and maintenance of experiment stations. It is felt that this division of duties will prevent overlapping and will make for efficiency.

4. By a rearrangement of duties in the two "Agriculturist" Divisions it has been found possible to give the undivided attention of one of the Divisions to problems of rubber agriculture, the other Division having as its sphere of interest all crops other than rubber. In order to facilitate this arrangement opportunity has been taken to transfer the direction of the three Government estates at Pondok Tanjong, Sapintas and Kuala Tembeling to the Planters' Loans Board.

5. The Advisory Committee was composed of the following members :

The Secretary for Agriculture (*Chairman*);
The Hon'ble Mr. J. W. Campbell, M.L.C.;
The Orang Kaya-Kaya Dato Panglima Kinta;
Mr. W. S. Cookson;
Mr. D. S. Gardner;
Mr. G. E. Henning;
Mr. M. J. Kennaway.

6. An Advisory Committee dealing with Chinese agriculture in market gardens was constituted and held several meetings during the year. At present its purview is, for practical purposes, limited to the State of Selangor. It is proposed gradually to extend its sphere of interest. A Chinese Sub-Inspector of Agriculture has been appointed to work under the direction of the Chief Agricultural Field Officer for the supervision of Chinese market gardens and the rendering of assistance to gardeners especially in the direction of food production.

7. The Committee is at present composed as follows :

The Secretary for Agriculture (*Chairman*);
The Chief Agricultural Field Officer;
Mr. Khoo Keng Hooi;
Mr. Yap Tai Chi;
Mr. Yap Tai Seng.

RUBBER.

8. At the commencement of the year the London price of ribbed smoked sheet was 1*s*.2*d*. per lb. with a local price of 49 cents per lb. The price fell to 10*d*. (London) and 31½ cents (local) in May, but rose in the latter half of the year, reaching 1*s*.7*d*. (London) and 67 cents (local) in December. The export of rubber from the Federated Malay States for 1924, was 93,507 tons as against 102,818 tons during 1923. In addition 783,491 gallons of latex were exported.

9. The "Standard Production" for the second year of Restriction (1st November, 1923, to 31st October, 1924 for the Federated Malay States was placed at 142,264 tons and was classified as follows :

Estates over 100 acres	94,872 tons.
Holdings between 25 and 100 acres	9,420 ,,
Small holdings	36,990 ,,
Estimate for properties not assessed	982 ,,

10. The "Standard Production" for the first year of Restriction was 162,350 tons. This was classified as follows :

Estates over 100 acres	107,557 tons.
Holdings between 25 and 100 acres	10,793 ,,
Small holdings	44,000 ,,

11. On the 1st January, 1924, the stocks of rubber in the United Kingdom were 66,563 tons. At the close of the year these had been reduced to 32,376 tons.

12. Experience during the year under review tends to shew that where daily tapping is continued over a period longer than three months there is normally an increase in the incidence of diseases affecting the tapping cut. As a result of careful comparison of tapping methods on many estates it would appear certain that daily tapping continued over a period exceeding three months encourages a parasitic habit in fungi usually saprophytic. It is for each proprietor to determine, having in view special circumstances (economic and other) affecting his cultivation, what the proper periodicity is for "change over" tapping. "Restriction" has given pause to consider the economic value of pre-restriction modes of tapping as compared with other methods which have been forced on us since November, 1922. Conservative systems of tapping, besides preservation of bark, mean lower disease incidence and prolongation of yielding capacity.

13. Some of the older rubber holdings in Malaya contain ten to fifteen per cent. of trees affected with root disease (usually Wet Rot caused by *Fomes pseudo-ferreus* or Dry Rot caused by *Ustulina zonata*). Careful individual attention is being given to such areas by this department. It is impossible to generalise as to treatment. The economics of treatment and results are paramount considerations. In one case at least expensive treatment, whereby mature trees were reduced to forty per acre, has been repaid by increased yields.

14. A bulletin on the subject of brown bast was issued during the year, detailing tapping experiments over four years. All evidence points to a "physiological" causation, excessive extraction of latex being the predominating influence. During the restriction period the incidence of this disease has been so low that enquiries with regard to it have practically ceased.

15. A new Bark Disease was reported and written up in the *Malayan Agricultural Journal*. Recent inoculation experiments by the Mycologist have proved the fungus to be weakly parasitic.

16. The incidence of Pink disease was lighter than in 1923. Wet weather towards the end of the year was followed by an increase in the number of reports. Altogether 1,191 notices requiring treatment of this disease were served during the year; for failure to comply with such notices there were 50 convictions. Demonstrations in the field relative to the treatment of this disease were given by the field staff. Instructive pamphlets in Malay and other languages were freely distributed.

17. Mouldy Rot (*Sphaeronema fimbriatum*) has been kept under control. During the year 3,381 notices requiring treatment were served. For failure to comply there were 272 convictions. New outbreaks were reported in Selama and Batu Kurau (Perak) and at Tras, Raub and Kuala Lipis in Pahang. Continuous effort is made to teach rubber growers, especially small holders, how to recognise and treat this disease. Lectures and demonstrations in the field are given, a pamphlet in four languages is distributed and a cinematograph film used where it is possible to display it with effect.

18. Generally as a result of "Restriction" and improved sanitation measures there was, during the year under review, a marked reduction in the incidence of "stem" and "root" diseases.

19. Work by the Plant Physiologist was almost entirely on Hevea latex, and was mainly directed to :

(*a*) Chemical and physical phenomena connected with coagulation.

(*b*) The proteins and allied substance.

None of this work has reached finality. It suffices to state here that considerable time has been devoted to De Vries' recent theory that coagulation following on separation is, or may be, brought about by an enzyme in latex.

20. Special research on rubber had to give way to a considerable extent to the exigent demands of other agricultural products. A great deal of work was done by the Chemical Division relative to latex and its dry rubber and ammonia content in preservation. Details were taken of monthly variation in dry rubber content of latex. It is interesting to note that the results of investigation shew the average dry rubber content of latex to be but a very small fraction above the standard for export of latex fixed by the Government for purposes of export duty, viz: 3.5 lbs. of dry rubber per gallon of latex. Altogether 2,864 latex samples were analysed during the year. These investigations have suggested other problems connected with latex: experiments of very considerable interest are being continued.

21. Interesting work was done in connection with a species of "slab" rubber (matured coagulum) which had a ready sale, at a slight premium, among certain buyers in the United States of America, though its cost of preparation is less than that of other first grade rubbers such as smoked sheet or pale crepe. Investigation shewed the advantage of a moist atmosphere in the preparation of "slab" rubber.

22. Work done in connection with the manufacture and cold storage of raw crepe and coloured mats was of considerable advantage to manufacturers. Mats made of vulcanised latex also came under investigation.

23. Investigation was made as to the quality of rubber obtained from latex after various resting periods. Tests relative to the quality of various latex papers were completed. Considerable time and attention was given to the determination of the rubber content of articles manufactured for export—tyres, shoe soles and such like.

24. In response to local enquiry demonstrations were made of the production of oil by the dry or destructive distillation of lower grade rubbers—a process which had been investigated some years ago in this department and elsewhere. This oil may be a useful product for internal combustion engines but it will require at least eight pounds of rubber to produce a gallon of oil. There is, however, no reason why the oil should not be found useful as a solvent or for certain medicinal purposes.

25. Investigation of the mechanical extraction of gutta-percha (getah taban) from the leaf was completed with satisfactory results.

26. Jelutong rubber, now used in composition with chickle gum for the manufacture of chewing gum in the United States of America came under investigation and had considerable attention from the Chemical Division, advice being given to manufacturers relative to coagulants, preservatives, etc.

27. A valuable paper on the "Preparation of Rubber" (since published by the department in pamphlet form) was read by Major Eaton while on leave in England at a conference of Rubber Manufacturers, Chemists, etc., arranged by the Rubber Growers' Association and the Research Association of British Tyre and Rubber Manufacturers.

28. On the 25th November, 1924, the Federal Council approved a proposal for the creation of a Rubber Research Institute and for the introduction of legislation for its incorporation. The importance of this measure cannot be exaggerated. Co-ordination of brain power employed on research will at length be secured. Plantation and factory methods will receive authoritative direction and advice by an agency the activities of which will be guided by representatives of the industry from which its funds will be derived.

PALMS.

29. Coconuts.—The price of copra was $12.50 per picul in January, sinking to $10.50 in April and recovering to $13.65 in late October. At the close of the year the price stood at $13. The export of copra from the Federated Malay States for the year was 55,197 tons valued at $9,641,012 as against 49,037 tons valued at $8,190,701 for 1923.

30. In connection with the study of variation and selection experiments individual yields of fruit were recorded monthly from 450 coconut palms. These records though maintained for the special purposes stated above will be useful as supplying data for examination of yield periodicity and correlation between rainfall and yield as well as between type of tree and yield.

31. Study is being made both of local and introduced types with a view to exact classification.

32. Selection experiments were this year started on a fifty acre block of heavy alluvial land near Klang. Twenty-five seedlings from each parent (selected) palm were planted. At the end of the year forty acres had been fully planted with seedlings from 84 palms selected as heavy yielders from three coast districts. In addition trials have been made with twenty-four local varieties as well as with five from Ceylon and six from the Philippines.

33. Some of the catch crops favoured on coconut estates have been planted at the Klang Station for experimental purposes—sweet potatoes, ground nuts, coffee, soya bean, chillies and gingelly. Trial is also made of manures—lime, superphosphate, guano, salt and fish offal.

34. Effort has been made to improve our statistics of coconut cultivation. Though the following figures are not exact they are not far wrong:

	Acres.
Perak	75,281
Selangor	62,117
Negri Sembilan	6,604
Pahang	19,400

A total of 163,402 acres under coconut cultivation. Of this total the area in estates of over 100 acres is 61,996.

35. Control of pests of the coconut palm was steadily maintained. Two thousand seven hundred and twenty-two notices were issued for the destruction of decaying matter serving as breeding grounds for beetle pests. There were 173 convictions for failure to take the necessary measures for sanitation.

36. Outbreaks of Artona (*Brachartona*) *catoxantha* were reported from Lenggong and Tanjong Piandang in Perak and from Sungei Ayer Tawer in the Kuala Selangor district. These were controlled by the insect parasites which, fortunately for the local coconut industry, are found in this country. Fiji, not as fortunate as Malaya in having these parasites within its borders, sent two Entomologists to Malaya during 1924 for the purpose of obtaining these insects for the control of the pest in that country.

37. Skipper caterpillars (*Hidari Thrax*) did some damage in the Kinta, Kuala Pilah and Temerloh districts. To combat squirrel pests, steps are taken to supply traps and to encourage regular hunting of these vermin in localities where marked damage is done.

38. African Oil Palm.—Considerable interest in the possibilities of this palm as a large-scale plantation crop was shown. At the end of the year between 5,000 and 6,000 acres of oil palms had been planted in Malaya. This acreage is likely to increase very materially in the near future. During the latter part of the year, a modern plant for the extraction of oil was installed on an estate in Selangor. Approximately 295 tons of oil and 40 tons of kernels were exported from the Federated Malay States during 1924.

39. Many problems present themselves for solution in connection with the establishment of this promising industry. The supply of good selected seed, cultivation methods and suitable cover crops, pruning and pollination, pests and diseases, harvesting, manufacture, the control of free fatty acids, the discovery of the most economic form of container for the oil are matters of the deepest interest to prospective planters of oil palm and, as such, have had the most serious and concentrated attention of the department during the year under review. The market for this oil is controlled from Liverpool, to which port is sent practically the whole of the African output. This is still estimated as approximately nine-tenths of the world's production.

40. During the year the price of palm oil was fairly steady in the neighbourhood of £40 a ton. Malayan palm oil has already obtained for itself a high reputation as a good standard oil. Being a plantation product and consequently more capable of free fatty acid control than the produce of indiscriminate collection in other countries it may be expected that our palm oil will continue to command a premium in the European market.

41. Opportunity was taken by Major Eaton, Agricultural Chemist, while on leave in England, to study recent developments in oil palm machinery. In an article which appeared in the *Malayan Agricultural Journal*, vol. XII, No. 12, he published a full account of his investigations in this direction.

42. Investigation was started to ascertain what effect insects have on the pollination of the oil palm in Malaya. Preliminary results indicate that they have little if any influence. An area containing 19 trees was kept under observation for a month and insects visiting the flowers were caught daily. In this manner 694 insects were caught at the flowers, but not in a single case was one caught or seen on the female flowers, their attention being exclusively devoted to the pollen.

43. Mycological research throughout the year was attracted rather to diseases of palms than to rubber. Increased interest in the African Oil Palm greatly stimulated research in a subject which has had surprisingly little scientific attention until two or three years ago. Interest was concentrated on Bud Rot Disease, Crown Disease of young Oil Palms, and on certain diseases of coconut palms hitherto confused with Bud Rot. A Black Line disease of the roots of young coconuts has had much attention. A very great deal of careful investigation, with satisfactory results, has been given to a fruit disease of the African Oil Palm.

PADI.

44. The 1924 padi harvest was up to average in Perak and Negri Sembilan. In Pahang and Selangor some damage was caused by heavy floods and the harvests were a little below average.

45. The 1925 harvest promises well in all States, planting conditions in 1924 having been unusually good.

46. Experimental work at Titi Serong (Krian) was continued throughout the year. From January until the harvest in March careful records were made of the vegetative characters displayed by the different varieties of padi grown as foundation stocks.

47. Just before harvest with the assistance of the Railway Department facilities were given to Penghulus and others interested in rice cultivation to visit this experiment station for instructional purposes. Some 300 Malays came from outside Perak to view the crops and to learn something of the methods employed for seed selection. His Highness the Sultan of Selangor and his suite paid a visit and shewed keen and appreciative interest in Mr. Jack's work. This experiment station, at harvest time especially, cannot fail to be an object lesson to those acquainted with conditions of rice cultivation in other parts of the Peninsula where seed is mixed and where similar irrigation and drainage facilities do not exist.

48. Opportunity was taken at this period to demonstrate the results obtained by growers of selected seed in Krian. In one locality some forty acres in contiguous blocks had been planted by local Malays with a selected strain from Titi Serong (No. 36). Sections of this crop were cut, threshed, measured and weighed in the presence of numbers of interested rice planters. It was found that the yield averaged 910 gantangs of padi per acre. This return was more than 30 per cent. higher than the highest previously recorded from this land.

49. Thirty-four strains were tested for yield during the season and, of these, fourteen were selected for continuation tests. Of four popularly sought varieties 4,700 gantangs of seed were distributed to Krian applicants for use during the present season, 1,900 gantangs of this total being the strain referred to in the last paragraph. Altogether some 200 strains are maintained as foundation crops at Titi Serong.

50. In addition to direct distribution from Titi Serong a great deal of distribution has been made, as far as possible under supervision and advice, by those who grew selected strains last year. It is safe to say that 8,000 acres in the Krian district, or more than 1/7 of the irrigated area, is under selected strains this year (1924-25).

51. To districts outside Krian 5,600 gantangs of selected seed were distributed for use. As well as in each of the Federated Malay States trials are being made in Penang, Malacca, Kedah, Kelantan and Trengganu.

52. In pursuance of its policy of safeguarding food supplies and encouraging the production of rice, the Government acquired full ownership of a rice mill at Kuala Kurau, Perak, during the year.

53. For the encouragement of local milling (particularly the use of small power rice mills by Estates) a reduction was made in rates of freight on padi carried by rail on the Federated Malay States system.

54. Manurial plots were maintained at Kuala Kangsar and dry padi cultivation was started at Serdang, four good varieties being tried with a view to selection.

55. At the Talang test station in Perak, at Kuala Pilah in Negri Sembilan, Klang and Kluang in Selangor and Pekan, Kuantan and Raub in Pahang experimental work on padi on the lines found so successful at Titi Serong has been inaugurated. Varying soils call for different methods of cultivation and for concentration on the selection of suitable seeds.

56. For the assistance of cultivators in Pahang, where fields suffered badly in the floods of 1923, the department provided more than 10,000 gantangs of seed during 1924. This included 1,600 gantangs of selected seed.

57. Regarding insect pests of padi there is nothing unusual for record. Pianggang (*Leptocorisa Spp.*) which was such a pest in Johol during 1923 was effectively dealt with by an ingenious apparatus of local contrivance.

58. An intensive campaign against rats in the Krian Irrigation Area was commenced at the end of November. On conservative reckoning it is estimated that these vermin destroy six per cent. of the Krian padi crop. The campaign was initiated with the object of inducing cultivators to take a more active and practical interest in the problem of rat destruction and also to obtain information relative to the best methods of controlling this pest in this country.

59. Experience gained should be specially valuable to Oil Palm planters who find rat destruction rather an anxious and expensive consideration as soon as their palms have reached the bearing stage.

60. An area of about 30,000 acres was tackled in Krian. Poisoning, trapping and fumigation were the methods employed. With the co-operation of the District Officer and the Executive Engineer, Public Works Department, a good start was made and considerable experience was obtained before the end of the year in the preparation of effective poisons at low cost. Sodium Arsenite, Barium Carbonate and Calcium Cyanide were the principal chemicals used. Four thousand traps were distributed. Before the end of the year over 50,000 rats were known to have been destroyed. A small reward is paid per tail.

OTHER CROPS.

61. Nipah.—In the Kuala Selangor district of Selangor considerable and interesting progress is being made in the cultivation of Nipah in large holdings. The total area now planted is in the neighbourhood of 900 acres.

62. With a view to obtaining the most recent information on commercial methods relative to the production of power alcohol from Nipah a visit was paid to the producing areas in Borneo by Mr. Dennett, Assistant Agricultural Chemist, with valuable results.

63. In this country a great deal of experimental work on this palm was done during the year. Tapping experiments were continued on an area reserved at the 15th mile, Klang-Kuala Selangor road and determination was made of the sugar content of the juice as well as preservative methods having in view the possibility of sugar production. Results have been published in the *Malayan Agricultural Journal*.

64. Salinity determinations and observations were taken of soils apparently well suited to nipah cultivation. Various analytical data with reference to these soils have been collected. Further developments with this palm in Malaya will be of interest but as yet it is a matter of uncertainty whether there is sufficient or suitable land for any considerable extension.

65. Tapioca.—Within the Federated Malay States this crop is cultivated mainly in Pahang. The exports from the Federated Malay States during 1924 were as under:

	Tons.		Value.
Flake	2,016.6	...	$331,349
Flour	347.0	...	16,169
Pearl	422.14	...	72,546
Ampas (factory waste)	1,553.35	...	20,394

66. Experimental work is in hand with the object of ascertaining the wasting effect of tapioca cultivation on soil. When results are known careful investigation will be made with a view to the discovery of practical methods for improvement of the fertility of land after cropping.

67. Investigations are in progress with a view to determining the economic value of this crop as a source of power alcohol.

68. Coffee.—An improved market has resulted in increased interest in coffees. Generally, the Liberian type has been found to succeed best, but Robusta is grown with success in some districts. At present the total area in the Federated Malay States under this form of cultivation is only slightly in excess of 3,000 acres. Intending cultivators have to face serious competition from Java, and increased planting of the Robusta types in Uganda and other parts of Africa.

69 Areca Nuts.—Interest has been shown in this crop and attention is being given to the possibilities of extended cultivation. The export from the Federated Malay States during 1924 was 1,412.7 tons valued at $249,225.

70. Pineapples.—Three problems, connected with this crop, require attention, namely, improved packing, variety of Pineapple, and crop rotation. An important consideration in marketing tinned fruits is an attractive container, and should it be found possible to export a higher class Pineapple than at present, a distinctive label and careful packing will do much to popularise Pineapples from this country.

71. Several varieties of pineapple have been secured from various sources and experimental trial of these on a field scale is being made at the Experimental Plantation, Serdang.

72. The treatment of land after cropping with pineapples is a difficult problem and is engaging the careful attention of the Department. Experimental work is in progress with a view to discovering the best methods (rotation of crops or other means) of refertilising land after cropping.

73. The export of tinned pineapples from the Federated Malay States for the year was 3,949 tons, the estimated value being $732,190.

74. Fibres.—In order to systematise work on fibres a Departmental Committee (the Agricultural Chemist, Agriculturist and Economic Botanist) was appointed on the 5th June.

75. Considerable work was done in connection with Sisal Hemp and the results were published in the *Malayan Agricultural Journal*, vol. XII, No. 11. This crop is well suited to Malayan conditions and might be grown in this country as profitably as in Sumatra, where there is now a monthly export exceeding 1,000 tons of fibre.

76. Investigations are in progress to ascertain the possibilities of this crop as a rotation following Tapioca.

77. Specimens of Sisal Hemp prepared at the Department from plants grown at Serdang were sent to England for report and valuation. The report (received in December) states the fibre to be of excellent quality and saleable in London at a similar price to that obtained for the best East African grades, viz., £50 a ton. Some of this fibre was sent for trial at the Convict Establishment, Taiping. The Superintendent has found a ready use for it and has asked for larger quantities. Samples have been distributed among manufacturers of cordage, rope and binder twine in Australia and were valued at £45 to £48 per ton. Samples of the best Philippine grades of this hemp were received and have been compared with samples prepared here. The locally prepared samples were found to be similar to the Philippine specimens.

78. An investigation of the fibre content of pineapple leaves is being carried out from leaves obtained from the Serdang Experimental Plantation. Waste leaves from a Chinese pineapple plantation in Klang have also been investigated and a sample of the fibre submitted to the Imperial Institute. A very favourable report has been received from the institute in respect of this sample. A consignment of 3 cwt. of the fibre is being prepared for despatch to the Belfast College of Technology who have promised to determine its spinning qualities. The extraction of pineapple fibre would probably prove economic only as a cottage industry.

79. Several planters have grown Roselle fibre, more or less on an experimental scale, and at least two of them have sold hand-made rope locally at a profit. A number of small consignments of the prepared fibre were sent to London, but as spinners do not care to take up small lots, these were disposed of with some difficulty. On account of market difficulties and also as a result of changed conditions on rubber estates, new clearings being more infrequent than formerly, the cultivation of Roselle on estates has now practically ceased. Recently, however, there have been enquiries for this fibre from New York by rope manufacturers. Seed is readily procurable locally. An area is maintained under this crop at Serdang for seed supply purposes.

80. Samples of Manila hemp were prepared late in the year from plants grown at Serdang. The colour and appearance of the samples resemble the intermediate grades of Philippine Manila hemp.

81. A small sample of Caraguata fibre was submitted to the Imperial Institute but no report had been received before the end of the year.

82. Fibre has been separated from wild banana plants taken from the local jungle. The tensile strength of this fibre was found to be inferior.

83. The tensile strength of various wild fibres have been investigated and chemical tests carried out to determine the purity of the samples prepared.

84. With regard to vegetable fibres it is always possible that plants now uneconomic may be developed to an extent which may make them suitable as textile fibres. Flax, for example, has been developed for fibre yielding purposes until it has become almost as different from wild flax as a cultivated rose is from a wild rose, similarly with cotton and other fibre yielding plants. The expansion of what is known as the "artificial silk" market may be held to warrant the scientific investigation of many fibre plants which are not now of clear economic importance. At the Serdang Experimental Station trial is being made of ramie, caraguata and Colombian pita as well as the better known fibre plants.

85. Fruits.—A large number of fruit trees were raised at the Experimental Plantation, Kuala Lumpur, and distributed during the year. Action is being taken towards the establishment at Serdang of a fruit garden for selection and improvement of Malayan fruits.

86. The growth of the rubber industry has had a depressing effect on fruit culture in the Peninsula, many fruit gardens having been sacrificed to rubber.

87. Cotton.—With the upward tendency in rubber there was less interest in this crop. Trials are being conducted in many districts.

88. The following results were obtained in 1924 under pure line cultivation conditions in poor sandy soil at Kuala Lumpur:

Strain No.	Origin.	Average wt. of seed cotton per plant in grams.	Calculated wt. seed cotton per acre in lbs.	Calculated wt. of lint per acre reckoning 30 per cent. lint.
1–1	Egyptian	29	390	115 lbs.
1–2	„	42	545	160 „
2–1	„	37	485	145 „
3–1	„	28	365	110 „
3–2	„	39	500	150 „
3–3	„	46	590	175 „
4–1	Sea Island	24	310	90 „
4–2	„	25	320	95 „
5–1	„	14	180	55 „
5–2	„	20	255	75 „
6–1	„	23	300	90 „
6–2	„	39	510	150 „
7–1	„	30	390	115 „
7–2	„	24	300	90 „
8–2	„	9	120	35 „
16–1	Egyptian	20	255	75 „
16–2	„	8	110	35 „
17	Sea Island	6	70	20 „
21	Cambodia	13	160	50 „

89. The above results are based on plots of 50 plants planted $2 \times 3\frac{1}{2}$ feet on ridges. The seed was sown at the end of February and good showery weather was encountered throughout the growing period. The months of July and August afforded ideal harvest conditions. Each strain was the progeny of a single plant selected from previous sowings in 1923. All the seed was gathered from self-pollinated flowers.

90. Pests (Leaf-Roller, Cotton-Stainer, Boll-Worm, Green-Fly) were noticeable in all stages of growth, but were controlled.

91. Samples of lint were sent to the British Cotton Growing Association, Manchester, for report and valuation, and some samples were commented on very favourably and highly valued—notably strains Nos. 3-3, 2-1, and 4-2 which were valued at 26*d.* and 27*d.* per lb., respectively, in August, 1924.

92. The best prospects for cotton cultivation appear to be in the eastern States of the Peninsula where more regular seasons are the rule and where rubber does not dominate the agriculturist.

93. Cinchona.—Small cinchona nurseries were established on Cameron's Highlands in July and the seedlings, which are doing well, were transplanted to secondary nurseries at the end of the year. Some 2,500 seedlings representing the two varieties, *C. Ledgeriana* and *C. Succirubra*, are thriving. Additional primary nurseries are being sown with a view to planting up three acres.

94. Cover Crops on Estates.—The use of cover crops is becoming more general and considerable attention was given to this subject at the Experimental Plantation, Serdang. A circular was issued by the Agriculturist's Division as a guide to Planters. At the Experimental Plantation, Serdang, 30 cover and green manure plants are under trial. Of these, the following are so far considered to be of first importance :

Purpose.	Plant.
Cover for open clearings	*Centrosema plumieri* *Calopogonium mucunoides*
Cover under shade	*Vigna oligosperma*. Sarawak bean
Soil renovators	*Tephrosia candida*. "Boga". *Crotalaria usaramoesis*
Green manure (for turning into the soil).	*Dolichos biflorus*. Horse Gram.

95. Fodder Grasses.—Investigations were carried out during the year, mainly at Serdang. A paper on the subject was published in the December number of the *Malayan Agricultural Journal*. Numerous enquiries for planting material have been received. As a cut fodder, Guinea grass has proved most satisfactory and 62,000 plants were distributed. Carpet grass, recently introduced from America, has proved an excellent general utility grass and a large amount of material was distributed.

96. Annual Crops.—Lima beans, Soya beans, Ground-Nuts, Tobacco and Maize were cultivated at the Experimental Plantation, Kuala Kangsar. The rainfall at Kuala Kangsar (68.5 inches during 1924), was comparatively low and in addition the soil is particularly suited to the cultivation of such crops. It is to be appreciated that the conditions of the greater part of the Peninsula are essentially those of a rain forest country, i.e., a heavy rainfall distributed throughout the year with uncertain seasonal variations. This, combined with the comparatively poor soils and numerous insect pests, makes the cultivation of annual crops, excluding Padi and Maize, a matter of considerable uncertainty. Present investigations indicate that such crops must be viewed as "market garden" work requiring intensive culture. Possible exceptions are Ground-Nuts and Gingelly which, under suitable conditions, yield good returns.

97. Kabu-Kabu.—For the purpose of assisting the Malay growers of silk cotton (kabu-kabu) on the Perak River the Department undertook the cleaning and marketing of floss, guaranteeing a higher price to growers than the 5 cents a kati for which Chinese buyers had been in the habit of acquiring the uncleaned cotton.

98. A hand cleaning machine on the Bley model was constructed for $60, and proved suitable (the model was borrowed from Java). It was found possible to clean floss down to 2 per cent. of impurities with this machine.

99. In competition the Chinese buyers put their price up to 12 cents a kati. It is hoped to induce Malays to purchase machines in 1925, and to produce themselves the cleaned material known by the trade name "kapok." His Highness the Raja Muda of Perak has interested himself in this scheme and it is only by his help that it has had some success in competition with Chinese traders who have hitherto controlled the market on the Perak River by a system of advances to tied cultivators.

100. Gambier, Etc.—As catch crops interest has been shewn in Gambier, Tuba Root and Patchouli. The price of Gambier has been comparatively high and with suitable conditions, i.e., spare labour and plenty of fuel, this crop appears worth consideration.

101. The market for Tuba Root is uncertain and until satisfactory outlets for this crop are found, its cultivation cannot be recommended. Exports from the Federated Malay States during 1924 amounted to 23,431 lbs.

102. Investigations relative to diseases of sireh and patchouli were satisfactorily tackled. Numerous disease specimens were examined and advice as to treatment was given by the Mycologist. Special attention was given to a serious disease of Jerusalem Artichokes and to certain diseases of Aleurites Montana and ground-nuts.

103. CHEMISTRY.—Special enquiries completed or in hand during the year may be divided as follows:

(i) Investigations on rubber and fibres.

(ii) Investigations on gutta-percha, nipah palm and tapioca.

(iii) Investigations on oils and fats and various forest products.

(iv) Investigations on soils and fertilisers.

104. Among oils and fats particular investigation was made of Illipe fat, ground-nut oil, rubber seed oil, dessiccated coconut, copra, coconut oil and copra cake as well as palm oil. Of essential or volatile oils investigation of lemon grass oil, distilled oil of limes, patchouli oil and vetiver oil was carried out. Samples were sent to the Imperial Institute and in addition to publication of notes in the *Malayan Agricultural Journal*, an article on the production of essential oils in Malaya was prepared by Major Eaton, and sent to England for publication by Messrs. Stafford, Allen & Co., in a new account of the production of essential oils in the Empire.

105. Work was done for the Forest Department on Damar Minyak and Malau.

106. One hundred and twenty-five applications for soil analysis were satisfied during the year. These include soils examined with a view to cultivation of oil palms, nipah palms, rubber, coconuts, padi and tobacco.

107. A Departmental Committee on soil investigations has been formed and definite lines of work have been embarked on. Perlis phosphates and guano from various localities have been subjected to careful analysis.

108. Miscellaneous investigations were of a varied character and engaged a great deal of attention. The range of these investigations is unlimited—from locally produced methylated spirit to a consideration of the possibility of using rubber for gramophone records.

109. Forty-seven reports were made on applications for grants of exclusive privileges for inventions.

110. GOVERNMENT PLANTATIONS.—On the Government Plantations at Pondok Tanjong, Kuala Tembeling, Sapintas and Castleton a sum of $132,955 was expended: the revenue was $126,393. Three of these estates were at the end of the year transferred for administration by the Planters Loans Board. The Castleton Estate, where experiments of some considerable value are in progress, is being retained for the present under the control of the department.

111. EXPERIMENTAL PLANTATION, SERDANG.—The object of this Plantation is the testing out of all crops other than rubber, coconuts and padi, and the supply of planting material of economic importance. Two Assistant Agriculturists were stationed at the Plantation during the year. A list of crops and economic plants established at Serdang was published in the *Malayan Agricultural Journal* (vol. XIII, No. 1). This list shews 165 species.

112. Research work on fodder grasses was undertaken during the year and results were published in the *Malayan Agricultural Journal* (vol. XII, No. 12). Careful attention was given to food crops other than padi and garden vegetables. A considerable supply of planting material has been accumulated. Good results have been obtained from imported yams, sweet potatoes, maize and ground-nuts.

113. The area of this Plantation is 1,525 acres of which 570 acres had been opened at the end of the year. During the year several additions were made, of which the following are the more important:

Coffee, ground-nuts, gutta-percha, tapioca, Prah, Manila Hemp, Caraguata fibre, Tuba, *Acacia farnesiana*, Mauritius grass, Sago palm, Oil Palm, Sisal hemp, tea (four Assam varieties).

114. Approximately 100 young trees of economic importance were planted in the arboretum during the year. Fifty-four species of plants were introduced: these include three new cover plants and two fodder grasses which shew considerable promise. Seed of ten selected varieties of coffee was obtained from Java and a large number of seedlings are available for planting in 1925.

115. Of particular importance is the experimental work relative to oil palm, tapioca, fibres and pineapples.

116. A large number of visitors were shewn round the Plantation during the year. These included His Highness the Sultan of Selangor and staff. The Incorporated Society of Planters paid a visit in July. The Advisory Committee of the Department held one of its meetings at the Plantation.

MISCELLANEOUS.

117. British Empire Exhibition.—A comprehensive exhibit illustrating the major and minor agricultural industries of the Federated Malay States was prepared for this Exhibition by officers of the Agricultural Department. A new edition of the Handbook of Malayan Agriculture was published and pamphlets descriptive of particular industries were distributed free of charge.

118. Agricultural Shows.—The Malayan Agri-Horticultural Association held a very successful three days Show and Exhibition at Kuala Lumpur as well as ten District Agricultural Shows. The success achieved by this Association should be very gratifying to its promoters. The Government contributes little pecuniary aid. This department supports and seconds the Association as far as its power goes, direction and initiative being left to the unofficial organisation.

119. School Gardens.—At the end of the year 250 school gardens had been registered in the Federated Malay States. Arrangements have now been made for inspection at regular intervals by officers of the Field Division and for the supply of seed. Teachers throughout the Federation shew appreciation of the value of these gardens both from educational and agricultural standpoints.

120. Stock.—Endeavour is being made to combat the effects of inbreeding of Malay owned stock, propaganda literature in Jawi being directed to that purpose and freely disseminated.

121. Two young Montgomery bulls have been purchased in India and are now at Tanjong Rambutan, where the farms supervised by Dr. Samuels give excellent opportunity for the acclimatisation and care of imported stock. At Tanjong Rambutan too there is already a numerous cross bred progeny from pedigree boars imported from the Philippines at the end of 1923. Encouragement is being given to importation of utility stock of proved use.

122. Resliming of Mining Land.—In three cases where land leased to tin dredging companies has a special site value the resliming of worked out land is enforced. In one case a dredging company is voluntarily resliming land. This department conducts experiments on the reslimed areas with a view to rendering the ground suitable for agricultural purposes. The slimes deposited vary from about nine inches to five feet in depth. For purposes of rapid supply of humus and adaptability to the slime soil Tephrosia Candida, Crotolaria Usaramoesis and Crotolaria Striata appear to be the most suitable crops. Experiment has been made with eleven different crops of this description.

123. Training of Malay Officers.—Two courses of lectures were given by the Research Officers of the department. On examination four officers of the Junior Agricultural Assistant class qualified for the higher grade and four probationers qualified for the Junior Agricultural Assistant class.

124. On the 15th December, a scheme for the more intensive training of Malay Officers came into operation. Under this scheme Malay Officers are released from clerical duties and will undergo both field and classroom instruction for a period of two years, instruction being concentrated at Kuala Lumpur and use being made of the Experiment Station at Serdang. Captain J. M. Howlett is Instructor and Raja Mahmud, Assistant Instructor.

125. The sixth annual conference of Malay Officers of the Department was held at Kuala Lumpur on the 18th, 19th and 20th November. At this conference, which was opened by the Chief Secretary to Government, Malay Officers had an opportunity of hearing lectures by members of the Research Divisions prepared for the purpose of keeping subordinate field officers in touch with the work done during the year at Kuala Lumpur and particularly with the practical lessons learnt at Serdang. Opportunity was given for a visit to the Experimental Plantation where further lectures were delivered in the field.

Kuala Lumpur,
4th May, 1925.

G. E. SHAW,
Ag. Secretary for Agriculture, S.S. and F.M.S.

Federated Malay States Government Press.